CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 89-055

SITE CLEANUP REQUIREMENTS FOR:

FMC CORPORATION
PHOSPHORUS CHEMICALS DIVISION
8787 ENTERPRISE DRIVE
NEWARK, ALAMEDA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the "Board") finds that:

1. FMC Corporation (hereinafter called the "discharger") operates a chemical manufacturing facility located at 8787 Enterprise Drive, Newark, Alameda County (the "Site").

2. FMC and predecessor companies have manufactured chemicals at this Site since 1929. The discharger currently manufactures phosphoric acid by burning elemental phosphorus, and phosphate products by processing phosphoric acid, sodium carbonate,and potassium hydroxide. The facility includes the distribution of hydrogen peroxide. Other chemicals have been produced at this facility in the past. In particular, ethylene dibromide (EDB) was produced at and on a site immediately adjacent to the present facility from the late 1920's or early 1930's until 1968. The discharger acquired the adjacent site from Designed Building Systems, Inc. on August 16, 1988.

3. The Board, on September 18, 1985 adopted Order No. 85-113, "Waste Discharge Requirements", and on May 20, 1987 adopted Order No. 87-49, "Amendment To Requirements", for FMC Corporation and Design Building Systems, Inc. These Orders prescribed a remedial action program and time schedule to address EDB in the groundwater.

4. As a result of a study conducted by the discharger in late 1980, EDB was discovered in the shallow groundwater zone (0-20 feet) beneath the Site. A number of other chemical compounds (1,2 dichloroethane (DCA), bromoform, dibromochloromethane, diethyl ether, bromochloromethane, methylene bromide, 1-chloro-2-bromoethane, benzene, bromodichloromethane, chloroform, carbon tetrachloride, and trichloroethylene) have been found at lower concentrations and may need further characterization to define their extent in the shallow groundwater zone. Investigations conducted by the discharger have effectively defined the EDB in the shallow zone.

5. Lower levels of EDB, DCA, and other chemicals have been found in the Newark Aquifer which underlies the shallow zone. In the vicinity of the Site the Newark Aquifer is located approximately 50-70 feet below the ground surface and is separated from the shallow zone by the Newark Aquitard (20-50 feet thick). The uppermost segment of this aquitard consists of a layer of heavy gray clay approximately 5 feet thick. This clay layer has halted the migration of EDB in the vertical direction across most of the Site. However, because EDB has been detected in the Newark Aquifer, there appears to be some interconnection between the two zones. The mechanism for the migration of EDB to the Newark Aquifer has not been positively identified but may be related to inadequate well construction or discontinuous hydraulic interconnection between the shallow zone and the Newark Aquifer. Additional hydrogeologic investigations and water quality testing are necessary to further define the extent of DCA and other chemicals.

6. Remediation of the shallow zone by the discharger consists of two steps. The first step was completed on June 24, 1986, and involved placing an asphalt cap over the areas of highest EDB concentrations, and lining the surface drainage ditches in the vicinity with concrete. The second step (currently being implemented) is the emplacement of a series of shallow zone extraction wells located adjacent to, and down gradient of the capped area. Additional measures need to be implemented to monitor the effectiveness of the shallow zone containment system.

7. Remediation of the Newark Aquifer by the discharger is currently under progress. The Newark Aquifer is penetrated by two extraction wells at the Site, both of which are currently being pumped. The extracted waters are treated on site via a granular activated carbon absorption system and then discharged to the Union Sanitary District. Previously these waters were reinjected into the Newark Aquifer, but due to the technical difficulties associated with this process, reinjection has temporarily been abandoned. Extraction has proven to be an effective method for remediation of the Newark Aquifer at this Site with EDB levels dropping in the aquifer within the first 12 months of operation.

8. The Newark Aquifer in the vicinity of the discharger's facilities, and for some distance eastward,is saline (chloride concentrations beneath the area average from 15,000 to 20,000 PPM). Further eastward the Newark Aquifer contains freshwater which is currently used for domestic and industrial purposes. The general regional gradient of the Newark Aquifer is westward toward the San Francisco Bay; that is, from the freshwater zones in the east toward the saline zones in the west. Much of the salinity in the western parts of the Newark Aquifer, at the discharger's facility, is the result of

saltwater intrusion due to past overdrafting for domestic and industrial use.

9. The Alameda County Water District (ACWD) is in the process of implementing a Salinity Barrier Project (SBP) which will withdraw saline water from the Newark Aquifer. This action will also cause freshwater from the eastern recharge zones of the Newark Aquifer to migrate towards the SBP wells, enabling domestic and industrial use of groundwater to resume in portions of the Newark Aquifer which are now saline. All water in the Newark Aquifer west, or bayward of the SBP wells will remain saline. The discharger's facility, and the affected zone in the Newark Aquifer, are west of the SBP wells as currently designed, and thus will remain in the saline zone.

10. Implementation of the SBP near this Site may accelerate the migration of EDB, DCA, and other chemicals, both horizontally within the Newark Aquifer and vertically from the shallow zone to the Newark Aquifer. During the July 1985 ACWD test pumping near the Site, drawdowns in the shallow zone and in the Newark Aquifer were observed to be 1-2 feet and 7-9 feet, respectively. In the absence of actions to prevent it, EDB, DCA, and other chemicals could migrate to the SBP extraction wells, possibly requiring treatment of the groundwater prior to the planned surface discharge.

11. Although mitigated by the remedial actions described in Finding 6, EDB may migrate from the shallow zone to the Newark Aquifer, irrespective of actions associated with ACWD's SBP.

12. Neither the Newark Aquifer nor the shallow zone near the Site has any known current beneficial uses. Potential beneficial uses of the Newark Aquifer underlying the Site include use as industrial and process service water supply. Portions of the Centerville and Fremont Aquifers, which aquifers have beneficial uses, are known to exist in the general vicinity of the Site. However, investigations conducted by the discharger to date, indicate that these deeper aquifers may not exist directly below the Site. The Board's concern with EDB, DCA, and other chemicals in the Newark Aquifer arises primarily from the possibility of migration to other waters having beneficial uses.

13. It is the intent of the Board to adopt Site Cleanup Order's for those sites affecting the ability of ACWD to protect the Newark Aquifer and/or other contiguous groundwater zones.

14. Proposed surface discharges from the SBP extraction wells would discharge to the South San Francisco Bay by means of Plummer Creek and the Newark Slough and/or through other means yet to be proposed (pipeline etc.).

15. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) dated December 1986. The Basin Plan contains water quality objectives and beneficial uses for San Francisco Bay and contiguous surface and ground waters.

16. The existing and/or potential beneficial uses of surface waters in the vicinity of the Site include:

    a. Contact and non-contact water recreation
    b. Wildlife habitat
    c. Warm and cold fresh water habitat
    d. Fish migration and spawning

17. In April 1985, the discharger conducted a risk assessment to evaluate the potential health and environmental risk posed by residual EDB present in the soil and groundwater at the Site. Pursuant to Provision C.1.a. of Order No. 85-113, this risk assessment was expanded in April 1986 to address additional concerns of the Regional Board and State Department of Health Services staff which included, among other things, the hydraulic interconnection between the shallow zone and salt-producing ponds in the vicinity of the Site, the long-term chronic health effects of EDB exposure to humans (via salt intake) or wildlife inhabiting the San Francisco Bay and Bay fringe, and an evaluation of the relative toxicity of EDB and the other chemical compounds listed in Finding 4. The proposal for the expanded risk assessment was reviewed and approved by the Regional Board staff. FMC's studies have concluded that remediation of EDB would effectively remediate the other compounds and that the presence of EDB in the shallow zone at levels of up to at least 1 PPM (the highest level evaluated) would not pose a significant risk to human health or the environment.

18. As acknowledged by the State Department of Health Services in a letter to the discharger dated February 1, 1989, adoption of this Order by the Regional Board constitutes the final action required for completion of the Remedial Action Plan for the Site Pursuant to Health and Safety Code Section 25356.1.

19. This action is an order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the CEQA pursuant to Section 15321 of the Resources Agency Guidelines.

20. The Board has notified the discharger and interested agencies and persons of its intent under California Water Code Section 13304 to prescribe Site Cleanup Requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.

21. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that the discharger shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous materials in a manner which will degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.

2. Significant migration of pollutants through subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup, which will cause significant adverse migration of wastes, are prohibited.

B. SPECIFICATIONS

1. The treatment or disposal of soil or groundwater containing wastes shall not create a nuisance as defined in Section 13050 (m) of the California Water Code.

2. The discharger shall conduct activities reasonably necessary to monitor the current local hydrogeologic conditions, and the lateral and vertical extent of wastes present in the soil and groundwater at the Site. Should monitoring results show evidence of the migration of wastes originating at the Site, additional characterization will be required.

3. Any wells and/or soil borings penetrating the Newark Aquitard shall be constructed to minimize the potential for waste migration between the shallow zone and the Newark Aquifer.

4. Any wells identified as potential conduits for the migration of wastes shall be properly abandoned, to the extent legally possible. A detailed workplan shall be submitted for review and approval, which describes the proposed methods of abandonment for each well identified.

C. PROVISIONS

1. The discharger shall review its existing groundwater monitoring program and shall propose within 60 days of the adoption of this Order, modifications as necessary to comply with this Order. This monitoring program shall

be acceptable to the Board's Executive Officer. The proposed monitoring program shall include, but need not be limited to, the identification/location of sample wells, the frequency of water level and water quality sampling, and the identification of methods chosen for sample analysis.

2. The discharger shall comply with Prohibitions A.1., A.2. and A.3., and Specification B.1. and B.2., by completing the tasks outlined below in accordance with the specified time schedule:

COMPLETION DATE/TASK:

a. COMPLETION DATE: October 15, 1989

TASK: SHALLOW ZONE CONTAINMENT NETWORK:
Submit a technical report acceptable to the Executive Officer which contains the plans for an evaluation of the shallow zone containment system described in Finding 6 above. The report shall specify a network of monitoring wells which will document the effectiveness which remediation of the shallow zone will have at this Site and any influences which have or may occur on plume migration at the sites of Ashland Chemical Company (Ashland), Jones-Hamilton Company (Jones-Hamilton), and Romic Chemical Corporation (Romic).

b. COMPLETION DATE: November 15, 1989

TASK: SHALLOW ZONE CHARACTERIZATION STUDY:
Submit a technical report acceptable to the Executive Officer which defines and includes the results of work performed to supplement and/or confirm the characterization of the extent of EDB, DCA, and other chemicals present in the shallow zone groundwater at the Site. This technical report should include the results of the potential conduit study completed by FMC in July 1986, and a summary and evaluation of all information the discharger has collected regarding the shallow zone groundwater.

c. COMPLETION DATE: February 15, 1990

TASK: NEWARK AQUIFER CHARACTERIZATION:
Submit a technical report acceptable to the Executive Officer which defines and includes the results of work performed to supplement and/or confirm the characterization of the extent of EDB, DCA, and other chemicals in the Newark Aquifer at

the Site. This technical report should include the results of additional characterization studies, and contain a summary and evaluation of all information the discharger has collected regarding the Newark Aquifer.

d. COMPLETION DATE: May 15, 1990

TASK: NEWARK AQUIFER REMEDIAL PLAN / FEASIBILITY STUDY: Submit a technical report acceptable to the Executive Officer which contains an evaluation of the current Newark Aquifer remediation in light of information collected in Provision C.2.c., and a proposal for additional remedial measures if necessary. If such additional measures are needed, the report shall identify and discuss the possible remedial alternatives, their feasibility, and their costs and benefits in relation to beneficial use protection. The report shall document and/or model the effectiveness which the revised remediation program for the Newark Aquifer will have at this Site, and on SBP operation, and any influences which have or may occur on plume migration at the sites of Ashland, Jones-Hamilton, and Romic.

e. COMPLETION DATE: August 15, 1990

TASK: GROUNDWATER REUSE AND/OR REINJECTION PLAN: Submit a technical report acceptable to the Executive Officer describing the groundwater use plan associated with the Newark Aquifer remedial plan. The report shall include an evaluation of the alternate methods for disposing of extracted and treated groundwater in accordance with Board Resolution 88-160, and reasons why these methods can or cannot be used. This evaluation shall also include a projection of their effectiveness, costs, benefits, and water quality impacts. If this report includes a proposal for reinjection of groundwater extracted on-site, plans should be submitted for a regular maintenance program for the injection wells to minimize the down time resulting from well and/or formation plugging.

3. On a quarterly basis, the discharger shall submit a technical report one month following the end of each quarter, commencing with a report for the quarter ending June 30, 1989 and due July 31, 1989. These quarterly technical reports shall include, but need not be limited to, the results of quarterly groundwater quality sampling of on-site and off-site wells, updated water table and potentiometric surface maps for all affected water

bearing zones, and any updated cross-sectional geologic maps describing the hydrogeological setting, and appropriately scaled and detailed base maps showing the location of all monitoring wells and extraction wells, and identifying adjacent facilities and structures (including well locations at adjacent sites). The Board urges that data collection be coordinated with relevant studies at Ashland, Jones-Hamilton, and Romic.

4. On an annual basis, for the previous calendar year, by the end of the second month following the calendar year, the discharger shall submit an annual technical report acceptable to the Executive Officer which shall document and evaluate the progress of remedial actions. This report shall contain, but not be limited to, information on the number of gallons of groundwater pumped and treated, where the waters were discharged, changes in groundwater quality, changes in the monitoring network, problems encountered in the past year with implemented and/or proposed solutions, and projected remedial actions anticipated for the coming year.

5. All hydrogeological reports, documents, plans, and specifications, shall be certified by one of the following: a registered geologist, registered pursuant to Section 7850 of the Business and Professions Code; a certified engineering geologist, certified pursuant to Section 7842 of the Business and Professions Code; or a civil engineer registered pursuant to Section 6762 of the Business and Professions Code, who has at least five years experience in groundwater hydrology.

6. If the discharger is delayed, interrupted or prevented from meeting one or more of the completion dates specified in this Order for reasons beyond its reasonable control, the discharger shall promptly notify the Executive Officer and the Board may consider revision to this Order extending the time for compliance for a reasonable period.

7. All samples shall be analyzed by State certified laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control records for Board review.

8. In order to effectuate Prohibition A.1., A.2., and A.3., and Specification B.1., and B.2., the discharger is encouraged to cooperate with Ashland, Jones-Hamilton, Romic, and ACWD.

9. The discharger shall maintain in good working order, and operate, as efficiently as reasonably possible, any facility or control system installed to achieve compliance with the requirements of this Order.

10. Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be provided to the following agencies:

    a. Alameda County Water District
    b. Alameda County Health Department
    c. City of Newark
    d. State Department of Health Services/TSCD

    The Executive Officer may additionally require copies of correspondence, reports and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order to be provided to the U.S. Environmental Protection Agency, Region IX, and to a local repository for public use.

11. The discharger shall permit the Board or its authorized representative, in accordance with Section 13267(c) of the California Water Code:

    a. Entry upon premises in which any pollution sources exist, or may potentially exist, or in which any required records are kept, which are relevant to this Order.

    b. Access to copy any records required to be kept under the terms and conditions of this Order.

    c. Inspection of any monitoring equipment or methodology implemented in response to this Order.

    d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger pursuant to this Order.

12. The discharger shall file a report on any changes in Site occupancy and ownership associated with the facility described in this Order.

13. If after the effective date of this Order, any hazardous substance is newly discharged in or on any waters of the State, or newly discharged or deposited where it is, or probably will be discharged in or on any waters of the State, the discharger shall report such discharge to this Regional Board, at (415) 464-1255 on weekdays during

office hours from 8 a.m. to 5 p.m., and to the Office of Emergency Services at (800) 852-7550 during non-business hours. A written report shall be filed with the Regional Board within five (5) working days and shall contain information relative to: the nature of waste or pollutant, quantity involved, duration of the incident, cause of spill, Spill Prevention, Control, and Countermeasures Plan (SPCC) in effect, if any, estimated size of affected area, nature of effects, corrective measures that have been taken or planned, and a schedule of these activities, and persons/agencies notified.

14. The Board will review this Order periodically and revise the requirements as necessary to effectuate the intent of this Order in a prompt and reasonable manner.

15. The requirements prescribed by this Order supercede the requirements prescribed by Order No. 85-113 and Order No. 87-49. Order No. 85-113 and Order No. 87-49 are hereby rescinded.

I, Steven R. Ritchie, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on April 19, 1989.

Steven R. Ritchie
Executive Officer